UNITED STATES PATENT AND TRADEMARK OFFICE

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10/663,700	09/17/2003	Shinji Kimura	1288.43131X00	3969

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EXAMINER
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ART UNIT	PAPER NUMBER
2188	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/18/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 November 2006*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14 and 19* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14 and 19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____ .
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)	5) ☐ Notice of Informal Patent Application
Paper No(s)/Mail Date _____ .	6) ☐ Other: _____ .

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1.   A request for continued examination under 37 CFR 1.114, including the fee set

forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this

application is eligible for continued examination under 37 CFR 1.114, and the fee set

forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action

has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11

October 2006 has been entered.

Status of Claims

2.   Claims 1-14, and 19 are pending in the Application.

Claims 1-11, 14 and 19 have been amended.

Claims 15-18 remain cancelled.

Claims 1-14, and 19 are rejected.

Response to Amendment

3.   Applicant's amendments and arguments filed on 11 October 2006 in response to

the office action mailed on 11 August 2006 have been fully considered, but are moot in

view of the new ground(s) of rejection.

Claim Objections

4.   Claims 1-2, 6, 9, 10, 12 and 13 are objected to because of the following informalities:

As for claim 1, the phrase "one client which", as recited on line 3 of this claim should be changed to "one client" for clarity.

As for claim 6, the phrase "data to requires the encrypting" as recited in line 8 of this claim should be changed to "data requires the encrypting" for clarity.

As for claims 9 and 13, the phrase "data is associated with data storage block" as recited in line 2 of both of these claim should be changed to "data is associated with a data storage block" for clarity.

As for claim 10, the word "an" should be inserted between the word "notifies" and "occurrence" as recited in line 2 of this claim for clarity.

As for claim 12, the word "addition" as recited in line 3 of this claim should be changed to "additional".

Claim 2 is objected to for inheriting the deficiency of claim 1.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5.   Claims 1-14 and 19 are rejected under 35 U.S.C. 112, second paragraph, as

being indefinite for failing to particularly point out and distinctly claim the subject matter

which applicant regards as the invention.

Examiner notes that there are so many issues in these claims, that use of the

formal paragraph would be inefficient. Examiner will now address, claim by claim, the

issues which render the instant claims vague and indefinite.

As for claim 1, the phrases "the node device" and "the client device" as recited in

lines 8 and 13-14 respectively lack antecedent basis.

As for claim 3, the phrase "the client device" as recited in line 9 lacks antecedent

basis.

As for claim 4, the phrase "the client device" as recited in line 4 lacks antecedent

basis.

As for claim 10, the phrase "the client device" as recited in line 3 lacks

antecedent basis.

As for claim 11, the phrase "the node device" as recited in line 15 lacks

antecedent basis.

As for claim 13, the phrases "the storage unit" and "the node device" as recited in

lines 2-3 and 3 respectively lack antecedent basis.

As for claim 19, the phrases "the storage device", "the node device", "the client

device", and "the network", and "the client, as recited in lines 4, 8, 10-11, and 12

respectively lack antecedent basis.

All remaining claims are rejected for inheriting the deficiencies of their respective

base claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6.   Claims 1, 3, 4, 8, 9, 11-13 and 19 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Arimilli et al. (US PG Publication 2003/0009640 A1), hereinafter

Arimilli, and in further view of Moran et al. (US Patent 7,139,890 B2), hereinafter Moran.

As for claim 1, Arimilli teaches a cache control method in a computer system that

includes a storage device having a plurality of physical devices for storing data (Fig. 1

(elements 14 depict multiple processing devices, each of which comprising a physical

device (i.e. cache for storing data))), at least one client (Fig. 1, element 12), a relay

device which relays data between said storage device and the at least one client (Fig. 1,

element 15 – the switch connects the client and processing devices), a cache disk

module for caching processed data being relayed between said storage device and

staid at least one client (Fig. 1, element 22 – the cache is used to store information sent

between the client and NUMA computer system node (Fig. 1, element 12)) , and a

network for connecting said storage device, said at least one client and said node

device to each other (the processing devices, client, switch, and arrows depicting paths

of communication comprise the network), the cache control method comprising:

a node device including a cache disk module for caching, and a client device

connected mutually via a network (referring to Fig. 1, the system includes a plurality of

host/client nodes (12) which are connected via a network switch (15). Each node

contains, *inter alia*, a memory (26) and a cache (22)), the cache control method

comprising:

relating data processed in the computer system with attribute data which

configures a caching operation of the cache disk module that caches the processed

data on the network (referring to Fig. 4, the page table entry (PTE) stores, *inter alia*, a

physical page number (98), a no intent to cache bit (110), and a node write through bit

(108) – paragraphs 0046 through 0047, all lines. The latter two bits help the system to

determine if the associated data should be cached, or not cached (i.e. written through to

the memory) – paragraphs 0048 through 0049, all lines); and

mediating the processed data between the storage device and the client

device via the network without the cache operation of the cache disk module

when the attribute data prohibits the caching operation (data received by a node

within the network is processed within the node based on the status of a plurality

of write through indicators (when an indicator is set, the data is written back to

the main memory rather than being cached – paragraph 0013, all lines). Note

paragraphs 0025 through 0026, all lines, describe data sharing among the nodes

and additional attached devices).

wherein a plurality of virtual volumes are formed on said physical device,

and each of said at least one client is assigned at least one of said virtual

volumes (paragraph 0040 and 0046, all lines – the physical memory of each

device is abstracted in virtual addresses which are comprised of virtual

segments/pages (i.e. volumes)),

wherein said attribute data is held in a cache attribute management table

which stores a plurality of entries each of which sets a corresponding relation

between identification information identifying one of said virtual page/segment

(Fig. 4, element 92 – paragraph 0046, all lines), and an indication whether data

stored in said one of said physics devices is cacheable or not (when an indicator

is set, the data is written back to the main memory rather than being cached –

paragraph 0013, all lines).

Despite these teachings Arimilli fails to specifically teach his cache disk modules

as being located in the relay device (i.e. switch). Additionally he fails to teach storing

identification information identifying one of the physical devices (he only teaches

identifying virtual addresses/volumes).

Moran however teaches a method and an arrangement to interface memory,

which includes a switch (i.e. hub – Fig. 1, element 110, which contains a memory,

element 130). Additionally, Moran teaches storing a device ID in a table in order for the

system to identify a memory or memory location to be referenced (col. 11, lines 26-44).

It would have been obvious to one of ordinary skill in the art at the time of the

invention for Arimilli to further include Moran's method and an arrangement to interface

memory into his own NUMA data processing system. By doing so, Arimilli could benefit

by having a more secure NUMA system which can mitigate the risk of potentially hostile

code to access the data within his system as taught by Moran in col. 1, lines 36-60.

Claims 3, 11 and 19 are rejected based on the same rationale as claim 1.

As for claim 4, Arimilli teaches the relay device according to claim 3, further

comprising:

A volatile memory for the caching, wherein the mediation unit mediates

the processed data between the storage device and the client device via the

network, by primarily using the volatile memory and secondarily using the cache

disk module (referring to paragraph 0004, all lines, Arimilli teaches the use of

volatile memory (i.e. RAM) as being used in a computer system for caching.

Additionally note (referring to Fig. 1), Arimilli teaches each node as receiving data

from the network via the node controller (16), at which point the data must

traverse a path via one or more of the processing units (i.e. element 14) before it

is stored in memory (26). In other words, the primary path is through the

processing unit (containing the cache). By default the data is stored within the

cache unless caching indicators are set to indicate that the data is to written

directly through (without caching) to the system memory).

As for claim 8, Arimilli teaches the relay device according to claim 3, wherein the

attribute data is included in the processed data, and the obtaining unit obtains the

attribute data from the processed data (paragraph 0048, all lines, the CPU sends the

data along with the indicator to instruct the hierarchy not to hold the data in cache).

As for claims 9 and 13, Arimilli teaches the relay (and storage) device according to claims 3 and 11 respectively, wherein the attribute data is associated with a data storage block of the storage device for storing the processed data (paragraphs 0046 through 0047, all lines, the no intent to cache and node write through fields are stored within each PTE entry, which stores each corresponding physical page number), and the obtaining unit obtains the associated attribute data from the storage device via the network in advance of mediation by the mediation unit (the CPU must obtain and process the indicator bits stored, then subsequently notify the node of the status before the mediation unit can determine if the data from the network is to be written to the cache or through to the system memory – paragraphs 0048 through 0049, all lines).

As for claim 12, Arimilli teaches the storage device according to claim 11, wherein the relation unit comprises:

an additional module that adds the attribute data to the processed data, and the added attribute data is mediated together with the processed data (paragraph 0048, all lines, the CPU sends the data along with the indicator to instruct the hierarchy not to hold the data in the cache).

7.   Claims 2, 5-7, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of Arimilli (US PG Publication 2003/0009640 A1) and Moran (US Patent 7,139,890 B2) as applied to claims 1, 3, and 11, and in further view of Benantar (US PG Publication 2002/0144119 A1).

As for claims 2 and 5, though Arimilli teaches all of the limitations of claim 1, he fails to teach encrypting the processed data. Benantar however teaches network

authentication processing via data encryption. More specifically, Benantar teaches

encrypting processed network data via a public key (Fig. 6, element 606).

As for claim 6, though Arimilli fails to teach the limitations of this claim, Benantar

however discloses an encryption obtaining unit that obtains encryption attribute data

related with the processed data, wherein the encryption attribute data configures an

encryption operation that encrypts the data (referring again to the flow chart illustrated

by Fig. 6, an attribute certificate is generated based on the keys which are used to

determine how the encryption process is to be carried out). Additionally, Benantar

teaches an encryption unit that encrypts the data when the encryption attribute data

requires the encrypting operation (Fig. 6 demonstrates the flow of how the encryption

process occurs based on generating the certificate from the public and private key

data).

As for claim 7, though Arimilli fails to teach storing key data, Benantar discloses a

volatile memory for storing key data used for generating the encrypted data (referring to

Fig. 5, the keystore (518) is used to store the key data. Note paragraph 0031, all lines,

the storage areas are described as either consisting of non-volatile or volatile memory).

As for claim 14, though Arimilli teaches all of the limitations of claim 11, he fails to

the remaining limitations of this claim.   Benantar however teaches a key management

unit that manages key data used for encrypting the data cached in the cache disk

module (Fig. 5, element 510 illustrates the SSO manager which manages the keys in

the keystore (518) used to encrypt the data). Additionally, Benantar discloses a key

notification module that notifies the node device of the managed key data (referring

again to Fig. 6, the authentication information generated (which was based on the key

information) is transmitted to the client to notify the client of the key information used to

encrypt the data).

It would have been obvious to one of ordinary skill in the art at the time of the

invention for Arimilli in further view of Moran to further include Benantar's encryption

system into his own NUMA data processing system. By doing so, Arimilli would benefit

by having a means of protecting data within nodes from unauthorized access across his

network system as taught by Benantar (paragraph 0004, all.lines).

8.   Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the

combined teachings of Arimilli (US PG Publication 2003/0009640 A1) and Moran (US

Patent 7,139,890 B2) as applied to claim 3 above, and in further view of Matsumoto (US

Patent 5,737522).

As for claim 10, though Arimilli teaches obtaining attribute data from the data

processed within the network, and teaches switching between caching an not caching of

the processed data, he fails to teach notifying the occurrence of an error in the client

device as claimed by Applicant. Matsumoto however teaches a serial I/O circuit with an

automatic transfer function, which notifies the system if an error occurred in the data

(col. 6, lines 6-56).

It would have been obvious to one of ordinary skill in the art at the time of the

invention for Arimilli in further view of Moran to further include Matsumoto's automatic

transfer circuit into his own NUMA data processing system. By doing so, Arimilli would

benefit by having a means notifying nodes within his network system of data errors. By

exploiting Matsumoto's notification process, Arimilli could greatly reduce the amount of

labor required to re-transfer the correct data as taught by Matsumoto in col. 5, line 54

through col. 6, line 3.

Response to Arguments

9.   Applicant contends that all informalities (i.e. claim objections) have been

addressed and corrected, however Examiner maintains that several claims have not

been corrected to address Examiner's concerns with respect to these objections.

Namely, the previously presented objections to claims 6, 9, 12 and 13 have not been

addressed through amendment in Applicant's response; therefore they are maintained

and repeated as per paragraph 004 of this correspondence, *supra*.

10.   With respect to the art rejections, Applicant contends "the present invention as

recited in the claims provides a structure that provides a computer system that includes

a storage device having a plurality of physical devices for storing data, wherein a

plurality of virtual volumes are formed on the physical devices, at least one client to

which at least one of the virtual volumes is assigned, a node device including a cache

disk module for caching data being transferred between the storage device and the at

least one client, and a network for connecting the storage device, the at least one client

and the node device to each other. Such a structure is clearly not taught or suggested

by Arimilli". This argument is rendered moot in view of the rejection presented *supra* to

address these newly added claim limitations (i.e. a node device including a cache disk

module for caching data being transferred between the storage device and the at least

one client).

Applicant further contends, "In Arimilli there is no teaching or suggestion that the

nodes 12 are connected between a client and a storage device as in the present

invention as recited in the claims". This argument is not persuasive, as Fig. 1 of Arimilli

depicts multiple nodes (i.e. clients) each comprising storage devices (as being

connected together via a switch).

Applicant further contends, "the present invention as recited in the claims

provides that the attribute data Is held In a cache attribute management table which

stores a plurality of entries each of which sets a corresponding relation between

identification information identifying one of virtual volumes, identification information

identifying one of the physical devices and an indication whether data stored in the one

of said physical devices is cacheable or not. There is no teaching or suggestion in

Arimilli of a cache attribute management table as recited in the claims". This argument

is rendered moot in view of the rejection presented *supra* to address these newly added

claim limitations (i.e. identification information identifying one of the physical devices).

Applicant further contends, "[a]t no point is there any teaching or suggestion In

Arimilli of the above described features of the present invention particularly regarding

the setting of a corresponding relation between identification information identifying one

of the virtual volumes, identification information identifying one of the physical devices

and an indication whether data stored in the one of said physical devices is cacheable

or not in a cache attribute management table". This argument is rendered moot in view

of the rejection presented *supra* to address these newly added claim limitations (i.e. identification information identifying one of the physical devices).

Lastly, Applicant contends, "In Arimilli, a network switch 15 relays data among a plurality of nodes12. Arimilli discloses data caching control in each of the plurality of nodes 12. Arimilli, however does not teach or suggest the data caching control in the network switch 15 as in the present invention. Further, PTE 82 in Arimilli is the data that CPU 20 refers to and is not, the data that is transmitted to the network switch 15 as in the present, invention. Thus, the network switch 15 of Arimilli is incapable of carrying out data caching control with PTE 82 as in the present invention as recited in the claims". This argument is rendered moot in view of the rejection presented *supra* to address these newly added claim limitations (i.e. data caching control in the switch itself).

11.   Applicant's contention that all dependant claims are allowable for further limiting all allegedly allowable base claims is not persuasive, as Examiner maintains that all pending claims are obvious in view of Arimilli, Moran, Benantar and Matsumoto per the rejections *supra*.
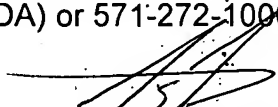
Conclusion

12.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig E. Walter whose telephone number is (571) 272-8154. The examiner can normally be reached on 8:30a - 5:00p M-F.

13.　　If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Hyung S. Sough can be reached on (571) 272-6799. The fax phone

number for the organization where this application or proceeding is assigned is 571-

273-8300.

14.　　Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Craig E Walter
Examiner
Art Unit 2188

CEW

HYUNG SOUGH
SUPERVISORY PATENT EXAMINER

1-10-07